Headquarters U.S.A.F.

Integrity - Service - Excellence

Understanding Business Intelligence

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What is Business Intelligence (BI)

The Users' Perspective:

Business Intelligence is the technology required to turn raw data into information   that supports decision making throughout   an organization.

The Technologist's Perspective:

BI is a broad category of application and   technologies for gathering, storing and

providing access and analyzing data to   help enterprise users make better and   faster   business decisions

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Data: Facts about events

Simply saving vast amounts of data does not ensure effective BI. To be useful, BI must turn data into information, and make it available in real-time, at the point of a decision.
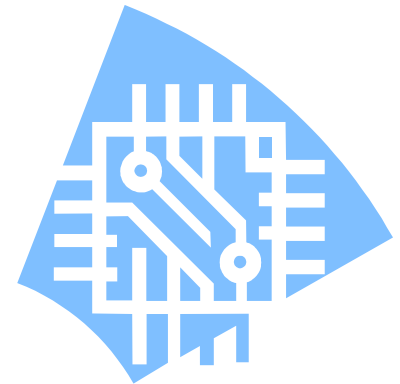
Why Business Intelligence

- **Managing a business on intuition, educated guesses or averages isn't good enough anymore**
- **The moment an organization begins operating, it begins generating data (production, warehouse, ordering, personnel, logistics, etc)**
- **In addition to internal data, there is a tremendous amount of external data (market data, raw material prices, supplier information, etc)**
- **None of this info can be used in its raw form to make decisions—but it is critical in helping to make them**
- **To be successful, an organization needs a foundation of accurate, current and complete information**
- **The information needs to have a common understanding across the organization**

Why Business Intelligence

- **We need to uncover trends and patterns that might otherwise go undetected:**
  - **Day-to-Day events**
  - **Look at what might be or what might happen**
  - **Provide notice to decision makers that something urgent might happen that may require their immediate attention**
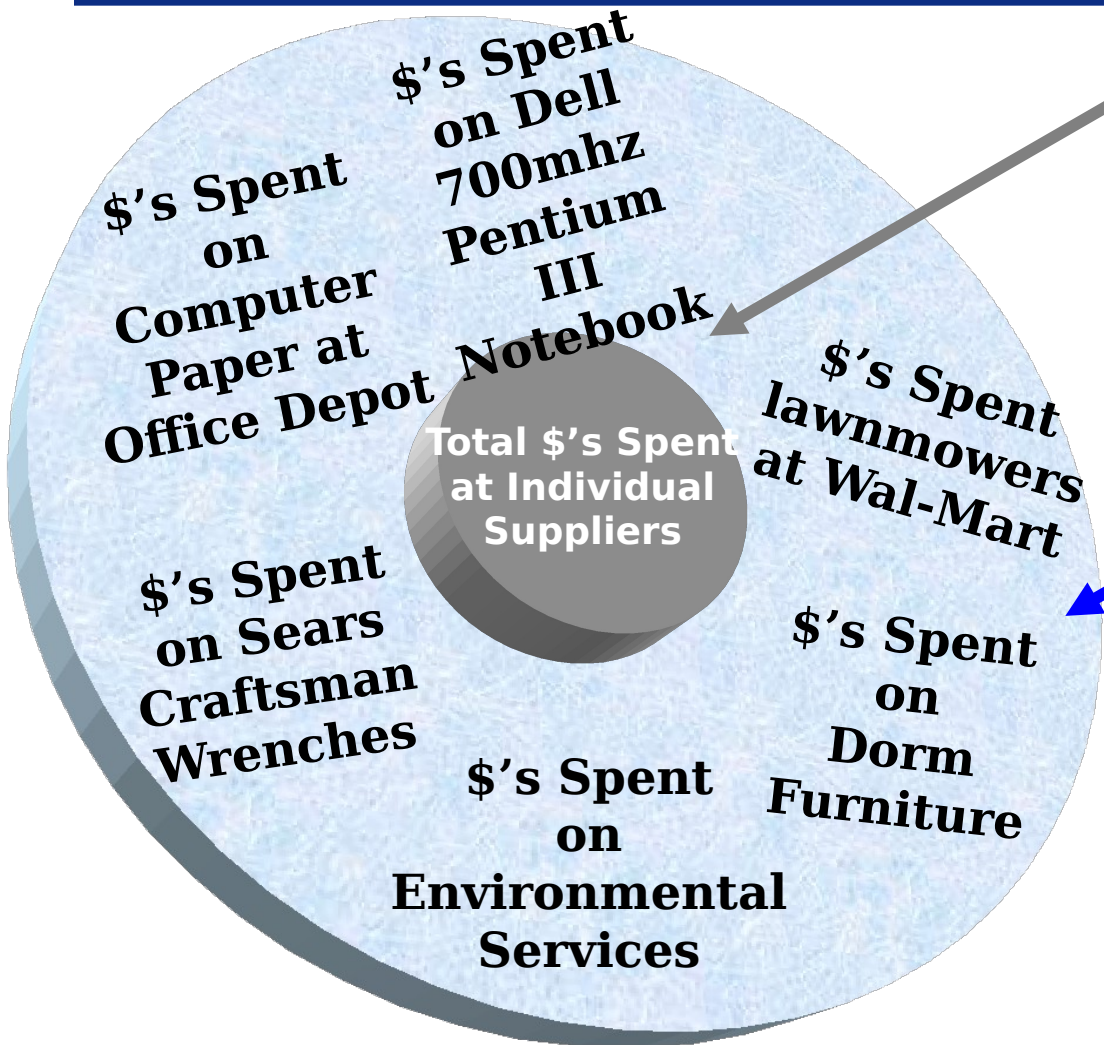 - **Support an in-depth study of an issue**

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Business Intelligence Makes Enterprise Data Actionable

Need to Improve Business Intelligence

$'s Spent on Dell 700mhz Pentium III Notebook

$'s Spent on Computer Paper at Office Depot

Total $'s Spent at Individual Suppliers

$'s Spent lawnmowers at Wal-Mart

$'s Spent on Sears Craftsman Wrenches

$'s Spent on Dorm Furniture

$'s Spent on Environmental Services

What I Can Tell You Today

What I Could Tell You Tomorrow!

Private Industry Experiences 10-15% Savings Leveraging Credit Card Business Intelligence

Warfighter buys more with less
--*More effectively & ch*

- **What is AF paying for products purch**
- **Which requirements should be consol to get better prices?**
- **Are we getting discounts we're entitle**
- **What purchases can be made locally concern for unfair prices?**

$

e'll Have Business Intelligence When We Install CRM

But it is not by itself Business Intelligence - only a source for it.

We'll Have Have Business Intelligence When We Install SCM

But it is not by itself Business Intelligence - only a source for it.

We'll Have Have Business Intelligence When We Install ERP

But it is not by itself Business Intelligence - only a source for it.

Enterprise Systems Are Not Business Intelligence!

All these initiatives share a need for more timely, detailed and current data from a broad range of sources. They have all resulted in long, costly implementations of sophisticated tools and applications to allow easier access and control.

Most of them require both ad-hoc queries and complex programming to enable companies to uncover patterns and relationship by digging through massive amounts of data.

Let's Compare Capabilities
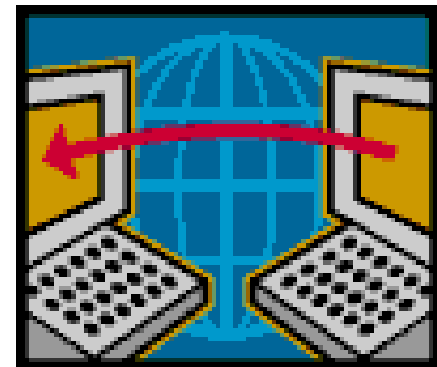
Transactional Systems

And

Business Intelligence Systems

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- OLTP (online transaction processing) applications typically have many users creating, updating, or retrieving *individua*

- BI applications are used by analysts and managers wanting historical, aggregated of the data

A transaction-oriented,

- *Focus on a business transaction, not the users*
- *Stable design because business processes more stable than user needs*

non-integrated,

- *No data correlation across systems*
- *May have duplicates*
- *Quality assurance not fundamental*

time-invariant,

- *A snapshot of a moment in time, rather than a history of data over time*

and volatile

- *Repetitions of the same query can give different results*
- *Constantly updated as transactions occur*

collection of data in support of business operations.

- *Focus on day-to-day operations, not long-term planning*

Business Intelligence

A subject-oriented,

- *Focus on a subject as defined by users*
- *Contains all data needed by the users to understand the subject*
- *Users change requirements rapidly*

integrated,

- *Data combined across systems and transactions*
- *No duplicates*
- *Quality assured.*

time-variant,

- *A history of the subject over time, not a single moment in time*

and non-volatile collection of data in support of management's decision-making process.

- *Doesn't change while a query is running*
- *Focus on planning for the future, not on day-to-day operations*

Transforming Data Into Information

Quality of the Information Available to Decision Makers is Directly Proportionate to the Quality of the Source Data.

Rule #1 In Business Intelligence:
A BI application containing invalid data is worse than   no data at all.

There are two types of invalid data:
Inconsistent data because it comes from different systems.
Data that was entered into the source system in error.

The Tools

- **Data Warehouse (DW)**
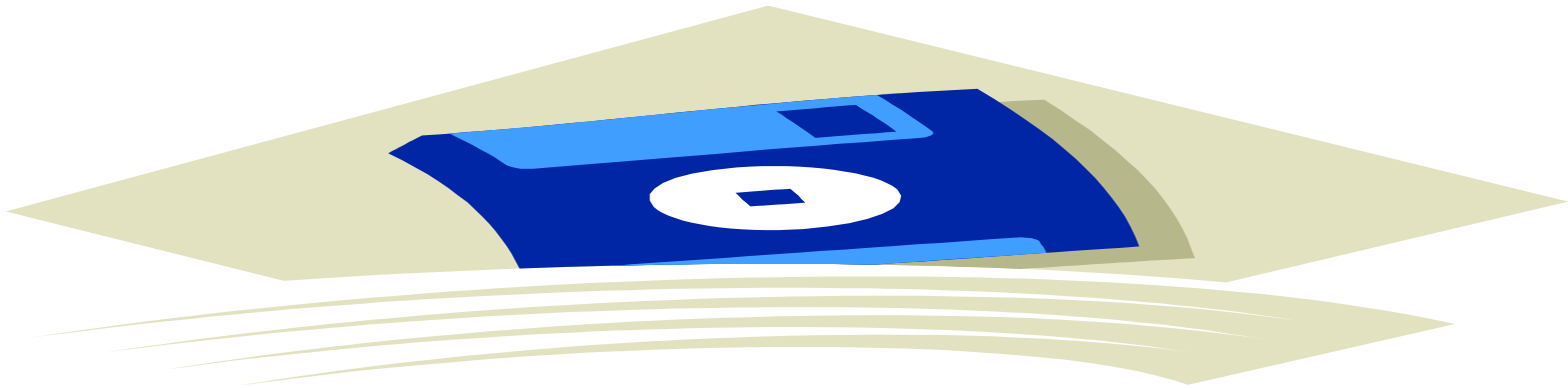
- **Data Mart (DM)**

- **On-Line Analytical Processing (OLAP)**

Data Warehouse (DW)

- **It is separate from the operational support systems environment.**
- **Designed specifically to serve the purpose of decision support, historical data mining, trending, etc.**
- **It contains history.**
- **It is subject-oriented.**
- **It introduces dimensionality and denormalization to the source system data.**
- **It resembles the business.**

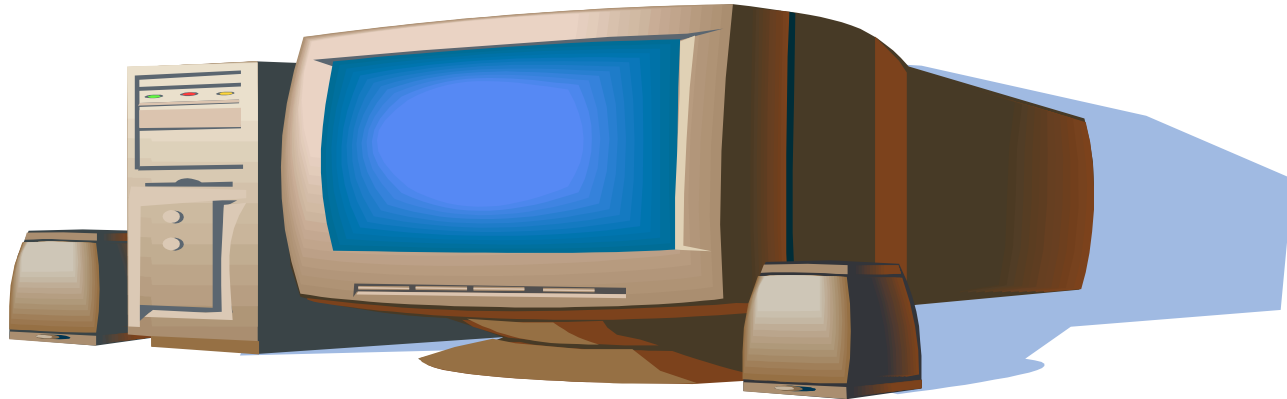- **OLTP systems are optimized for processing transactions, data marts are optimized for efficient reporting, using dimensional data modeling.**

- **Allows the system designers to portray the data in business terms vs. the technical constructs of the OLTP.**

- **The primary limitation of a data mart approach is scalability.**
- **To keep their intuitive features, data marts typically have a singular focus such as contracting, inventory, or financial analysis.**

On-Line Analytical Processing (OLAP)

- **The average business user should be able to browse a data mart and obtain moderately complex information with little or no training.**

- **OLAP is a way to view data across multiple business dimensions such as contracting location, suppliers, time, product and geography.**

- **Designed to answer questions such as:**
  - **"How many widgets were bought by which location in each region last month?" and**
  - **"How do those numbers compare to the prior month and the same period last year?"**

OLTP vs. OLAP

OLTP

- Real time, read/write to corporate data stores

- Many simultaneous internal and external users

- Short, repetitive, simple processing tasks

- Supports commerce and monitoring

- Integrity and guaranteed completion of tasks

OLAP

- As long as it takes, read-only access to corporate data stores

- Small number of primarily internal users

- Long, often unique, process intensive tasks

- Supports decision making and discovery

- Accuracy and completeness of information and results

- Ad hoc explorations as well as fixed reports

I n t e g r i t y - S e r v i c e - E x c e l l e n c e

Myths and Misunderstanding

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A BI capability need not contain information about all business or activities in the enterprise.

Myth No. 2:
BI Contains Only Summary Data

If BI contains only summary data, its usefulness is limited because business intelligence activities are restricted to only high-level analyses.

BI systems enable a wide range of analyses to be performed, both detailed (e.g., customer/product profitability) and high-level.

Adding levels of detail after implementation requires significant rework, at the outset the BI design should include the lowest level of detail in the operational systems.

Myth No. 3: BI must be built all at one time

Implementing BI can be a daunting challenge, given the complexity and effort required.

Implementing BI in a staged fashion may be preferable to achieve faster initial deliverables and minimize the risk of "trying to hit a moving target" due to business changes.

Implementing BI one data subject area at a time is a recommended approach that has consistently been successful.

Myth No. 4: BI will be used by Everyone in the Enterprise

An enterprise should not expect that all its personnel will use BI nor should the success of the project implementation be measured by such a standard.

Many personnel within the enterprise have no need or desire to use BI. On average, only about 15 percent of the staff of most large enterprises with a data warehouse infrastructure use BI consistently.

Strategic business functions (such as purchasing and finance) can derive significant business value through use of the data warehouse, while more-clerical functions (e.g., payroll) have less of an opportunity to do so.

Myth No. 5:
BI Loses its Value as the Business Changes

If BI is planned and designed properly, it need not decrease in value as the business evolves.

A solid design provides the flexibility to quickly adapt to changes in the business, enabling new analyses to be performed and new business approaches to be included with minimal disruptions and changes to the underlying structure.

The key to this process is a strict adherence to an application-neutral design of the BI data

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In the development of this presentation

Backup Slides

Headquarters U.S.A.F.

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So Why Do We Need <u>Another</u> Reporting System?

We Already Have All the Data We Need in Our Transaction Systems!

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Transaction Systems Reporting

- **Many small organizations and early BI adopters often access data for reporting directly from online transaction processing (OLTP) systems**

- **Typically utilizes a tool that has native connectivity to the OLTP database or the use of a generic data access protocol such as ODBC, JDBC or OLE DB to name a few.**

- **This type of reporting is often needed for time-sensitive reporting. (Time-sensitive reports are those that need to be up to date with transactions occurring within the last 24 hours.)**

- **This data is often "dirty," meaning that it does not accurately capture what it is meant to capture.**

Transaction Systems Reporting

- **An additional complexity associated with reporting directly from the source system is that the organization of the data is rarely intuitive to a business user. The data has been stored to optimize data entry, not to optimize data access.**

- **This often leads to programmers devoted to producing reports for others in the organization.**

- **When accessing the OLTP system directly for inquiries, the system performance for transactions is adversely affected.**

- **OLTP systems often do not store historical transactions beyond the past quarter or year. This can make an inquiry about the performance of a product over time quite difficult.**

Replicated OLTP – Production Reporting, but still not BI

- **Example – J018R**
- **An alternative one step removed from reporting straight from the OLTP system is to create an offline data store that is a replica of the production data store.**
- **The replicated data store can be refreshed as needed and often makes use of the same reporting tools. All user inquiries and reports are routed to the offline data store.**
- **Approach allows the OLTP to continue to process transactions, while another data store services the reporting needs of the end user. This benefits both equally.**

Replicated OLTP – Production Reporting, but still not BI

- **The biggest problem with Replicated OLTP is that it is designed to replicate the originating OLTP system!**
  - **Still carries much of the design used to process transactions, not to extract data**
  - **Still transaction oriented, and often rather cryptic in nature (codes rather than descriptions)**
  - **Still requires experienced programmers to extract information for reports**

Data Mart Definition

A single department

data warehouse

containing a small number of subject areas

- *Small, cohesive group of users*

- *<See previous slides>*

- *Very limited data set*

Transaction Database, Data Warehouse & Data Mart

	Transaction Database	Data Warehouse	Data Mart
Objective	Pull data in for transaction processing	Push data out to decision makers	Push data out to decision makers
Focus	Transactions	Subjects of interest to an enterprise	Subjects of interest to a department
Ownership	Fiefdom	Enterprise	Enterprise
Consistency	Microscopic (transaction level)	Global (enterprise level)	Global (department level)
Transaction Scale	Atomic (record level)	Summary of enterprise's data	Summary of department's data
Users	"Turn the wheels of the organization" e.g. sysops	"Watch the wheels of the organization" e.g. upper management	"Watch the wheels of the organization" e.g. middle management

Transaction Database, Data Warehouse & Data Mart (continued)

	Transaction Database	**Data Warehouse**	**Data Mart**
Number of Users	Many	Few	Very few per data mart
Type of Usage	Data entry; single record lookup	Periodically changing summaries of multiple records	Periodically changing summaries of multiple records
Time Dimension	Instantaneous snapshot, constantly updated	Static snapshot, regularly but infrequently updated	Static snapshot, regularly but infrequently updated
Data Modeling Technique	Entity relationship	Dimensional	Dimensional

Operational Data Store (ODS) - A Compromise

- **The ODS resides in the OLTP system environment.**
- **Typically serves the purpose of providing "near" real-time integration and reporting of data across disparate operational systems. It is designed for update.**
- **It is NON-historic**
- **It is subject oriented / highly normalized.**

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- **Don't believe it?**

- "Desktop BI"
  - –User requests a report from transaction system 'A', 'B' and 'C'
  - –User searches the reports for the key points of data needed
  - –Re-keys the data into a spreadsheet or desktop database
  - –Publishes information

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- **Problems With This Approach:**
  - **Information has different meaning to each user**
    - **Same data can be interpreted differently**
  - **Information is not widely available.**
  - **Quickly out-of-date**
  - **Limited in scope**
  - **"The person who used to do that quit/retired/died and no one remembers how to do it"**